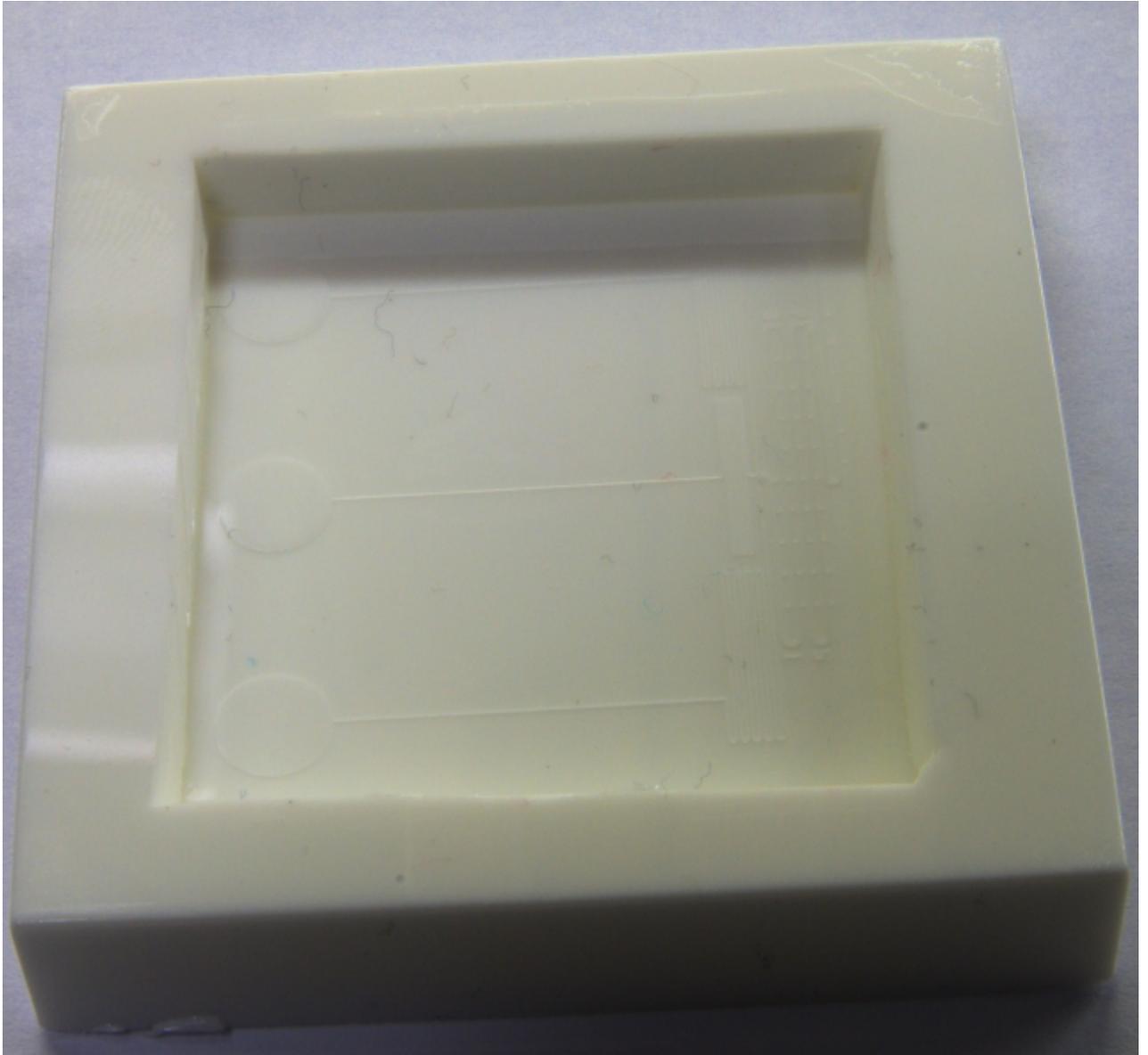


Coulter Counter

A Coulter counter is a device for counting individual cells. Cells are made to flow through a short, narrow channel while the resistance of the channel is measured. Because the cell blocks part of the channel, the resistance will increase while the cell is in the channel. This transient change can be used not only to count cells, but to estimate their size. The channel cross-sectional area needs to be small enough that the cell blocks a significant fraction of it. Moreover, the channel needs to be short for two reasons. First, so that the portion of the channel length blocked by the cell contributes significantly to the overall resistance. Second, so that only one cell is likely to be in the channel at a given time. Here we show two simple techniques for making a Coulter counter.

The first technique uses an existing microchannel design. A [plastic master](#) is made from a portion of a microchannel, as shown in the image below. The center channel in this master has cross-sectional dimensions of 50x75 micrometers.



This master is used to make a PDMS mold. We wish to take a thin section of this mold in order to get a short channel. The sectioning is done with a chopping tool as shown below. The length of the resulting channel slice is less than one millimeter.



This short PDMS slice is then bonded to a glass slide, channel-side down. Fluid placed on one side of the slice is carried through the channel by capillarity. The resistance across the channel can be measured by placing electrodes into fluid droplets on either side of the channel. The image below shows the PDMS slice with droplets of green fluid on either side. A bright line in the center of the device is the channel; green fluid has started to enter the channel from the right-hand side. The dark line below is a shadow of the channel that has been projected through the underlying glass slide.

